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FEDERAL COMMUNICATIONS COMMISSION
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Mr. William F. Caton
Acting Secretary
1919 M Street, N.W., Room 222
Federal Communications Commission
Washington, D.C. 20554

January 24, 1994

Subject: Cable Regulation/Proceeding on Compatibility Between Cable Systems and
Consumer Electronics Equipment
ET Docket 93-7

Dear Mr. Caton,

Enclosed is the original and nine copies of the Comments of The Titan Corporation in the above referenced proceeding.

Please address any questions to the undersigned.

Sincerely,

Charles F. Newby
Director,
Titan Broadcast Communication Systems

Enclosures

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THE TITAN CORPORATION
3033 Science Park Road • San Diego CA 92121
TEL (619) 552-9500 • FAX (619) 552-9654

Before the
FEDERAL COMMUNICATIONS COMMISSION
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OFFICE OF SECRETARY**

In the Matter of)

Implementation of Section 17 of the Cable
Television Consumer Protection and
Competition Act of 1992)

ET Docket No. 93-7

Compatibility Between Cable Systems and
Consumer Electronics Equipment)

COMMENTS OF THE TITAN CORPORATION

January 25, 1994

The Titan Corporation
3033 Science Park Road
San Diego CA 92121
Telephone (619) 552-9797
Fax (619) 597-9055

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Consumer Electronics Equipment

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COMMENTS

1 INTRODUCTION

The Titan Corporation ("Titan"), hereby respectfully submits comments to the Federal Communications Commission's ("Commission") Notice of Proposed Rule Making (NPRM) in the above-captioned proceeding. Titan has a strong interest in the Commission's implementation of the Cable Television Consumer Protection and Competition Act of 1992¹ ("Cable Act") in general and Section 17 in particular, because of its substantial involvement and familiarity in the development, manufacture, and sale of the access control (encryption) technologies that are so intertwined with the compatibility issues the Commission is concerned with in this proceeding. Furthermore, Titan's investment and experience in efforts to introduce competition in the supply of access control (encryption) equipment technology for satellite television, uniquely qualifies it to provide an important perspective on the various rules proposed by the Commission.

Titan applauds the efforts and cooperative work of both the cable and the consumer electronics industries. It is clear that the cable industry and the consumer electronics industry recognize the need to establish standards for transmission, decompression, and access control interfaces. Titan supports the most of the rationale that the Commission uses when developing its position relative to the rules² that it proposes in order to achieve the compatibility goals sought by Congress when it enacted Section 17 of the Cable Act.

While we have some doubts as to the cost effectiveness and therefore the advisability of the Decoder Interface required by the Commission in the NPRM, we recognize the current state of hardware incompatibility makes any elegant short-term solution impossible. We are however, very concerned that the Commission is ignoring some important issues that are addressed by Congress in Section 17 of the Cable Act. Therefore, we focus in these comments on our concern regarding

¹ Pub. L. No. 102-385, 102 Stat. 1460 (1992).

² "Report To Congress On Means Of Assuring Compatibility Between Cable Systems and Consumer Electronics Equipment", adopted October 5, 1993.

the longer term measures involving decoder interfaces and standards for digital transmission, compression, and access control interfaces. The discussion that follows is presented in the context of future digital transmission and access control, but is equally relevant in the context of analog scrambling and access control.

2 THE COMMISSION MUST RECOGNIZE THE PUBLIC INTEREST IN DEFINING THE BOUNDARY BETWEEN THE ACCESS CONTROL AND CONSUMER ELECTRONICS FUNCTIONS

The past practice of including the "decoder" and the "access control" functions in a single unit, the "converter box", through which the television signal must pass, has led to the incompatibilities that are the subject of this NPRM. Now that the Commission is considering rules that separate these two functions, we believe that it is essential that the line between the decoder function and the access control function be properly drawn. There are two important reasons for paying careful attention to this issue: 1) the Commission must assure that the incompatibility problems that are the subject of this NPRM are solved not only in the short-term but, more importantly, for the long-term and 2) the Commission must attempt, where possible, "to promote the commercial availability, from cable operators and retail vendors that are not affiliated with cable systems, of converter boxes and of remote control devices compatible with converter boxes;"³ We believe that the use of proprietary access control equipment by the cable converter box manufacturers has had the effect of limiting competition to one or at best two equipment suppliers. This practice has worked to the disadvantage of the American consumer as illustrated by the fact that we have paid, for many years, significantly higher prices for satellite television access control equipment when compared to equivalent equipment purchased in Europe where competition in access control equipment was an early requirement. As explained below, even though there may be some agreement between the cable industry and the consumer electronics industry, we believe that the Commission must make its own independent assessment by soliciting and then giving weight to the recommendations of other knowledgeable and interested parties. Since the interface between the cable television transmission system and the American consumer will change as a result of this NPRM, the Commission should implement rules that will not only eliminate current equipment incompatibilities but at the same time bring a new era of competition to the access control equipment market. We explain below how the interface between the decoder and the access control units should be defined and, more importantly, how properly defining these interfaces can benefit the American consumer.

2.1 The Hardware and System Distinction Between Decoding Functions and Cryptographic Functions

In order to frame our discussion on the issues of access control interfaces, we begin by a short exposition of terminologies and principles that in one form or another are present essentially in all television access control systems. Figure 1 shows various decoder interface configurations. In Figure 1(a), the well known stand-alone cable converter/decoder is shown to perform the tuning

³ See §624A(c)(2)(C).

function, the descrambling or decoding function and the function of remodulation of a clear signal that is subsequently fed to the input of the subscriber's consumer electronics equipment such as a TV set or a VCR.

Figure 1(b) shows an embodiment of a decoder interface whereby the tuning and conversion functions are performed in the TV set (or the VCR) and the received signal is provided to an outboard decoder module through an IF interface port.⁴ In this configuration, a demodulator is built-in the decoder module whereupon its output signal consisting of an encrypted bit stream is combined with a decryption keystream provided from a secure Access Control Unit to produce a decrypted (clear) bit stream that feeds the decompression circuit. Baseband video and audio signals are then provided from the decompression circuit to the consumer electronics appliance through the Baseband Interface port and the Interface Circuitry in both units. When unencrypted (clear) signals are received, the demodulator-decoder (decompressor) unit built-in the consumer electronic appliance is used, whereupon a decoder module will not be required.

The Access Control Unit within the decoder module receives from the demodulator the Access Control Messages. Those messages in turn are decrypted using the (unit specific and unique) secret information that is securely embedded within a secure enclosure, in order to produce the correct keystream for authorized decoding of the program. It should be clear that the Access Control Messages emanating from the demodulator contain no useful information to would be pirates, as these messages are encrypted under a key which resides or produced within the Secret Information sector of the Access Control Unit. Moreover, the keystream signal supplied from the Access Control Unit is equally useless to would be pirates, as it contains rapidly changing unpredictable key signals that continuously become obsolete every small fraction of a second.⁵ Thus, no unauthorized physical access, tampering or otherwise modifying the demodulator-decoder and decompression unit (which contains a keystream controlled decoder) or the interfaces thereto, can result in any security compromise of the system. Such breach of decoder security can only come from the compromise of the secure content or workings of the Access Control Unit. Thus, from the standpoint of security, in a properly designed system, one must make a distinction between the **decoding** functions (that are responsive to a non secure decryption keystream) that may be performed in a non secure demodulator-decoder-decompression unit and a **cryptographic** function (responsive to secure secret information which changes very infrequently) performed in a secure unit. The workings and operation of the demodulator, decoder (including its response to the keystream) and decompressor can be published, standardized and be supplied subject to genuine market competition.

⁴ Contrary to a suggestion by a party to this proceeding, for the digital modulation schemes contemplated by all digital transmission proposals, a video baseband interface cannot be used.

⁵ Even if a pirate who electronically observes the rapidly changing keystream attempts to distribute it to others, he will require a clandestine real-time communication network to all other pirate locations. However, this approach will be unworkable for any practical application involving realistic distances due to propagation delays.

Based on the above discussion, it should be clear that in new systems, there is no security reason for the functions of demodulation, decoding and decompression to be duplicated within the decoder and the consumer electronics appliance, just as there are no reasons that the tuner/converter functions be duplicated. Hence, the architecture of Figure 1(c) clearly emerges as optimal from the subscriber point of view. Here, the "Decoder Interface" is simply a keystream interface with an Access Control Unit that performs only the cryptographic functions in a secure enclosure such as a secure chip within a smart card or a Renewable Security module.⁶ This interface approach for pay television has been successfully deployed for some 3.5 million subscribers of British Sky Broadcasting ("Sky") service in Europe⁷ and is scheduled to be introduced in the U.S. on DirecTV's DBS system.⁸ The ability to combine an Access Control decoding function within consumer electronics equipment without compromising the security of the cryptographic system is evidenced by the fact that such TV sets, VCR's and stand-alone decoders from competing vendors with smart card interfaces have been produced and made available to Sky subscribers in Europe. Attachment A shows advertisements of such products in Europe. It is not the widely published encryption method and decoder functions that determine the security strengths of a subscription security system. Rather, it is the physical security and the secrecy of the unit specific secret information, or keys embedded in the secure Access Control Unit. Hence, unlike some older cable scrambling systems, the security strength of modern well designed security systems do not rely on any secrecy pertaining to their design or construct. The wide availability of such information through a standard setting process cannot detract from its security. For the same reason, subscriber ownership of such subscriber equipment (and a competitive supply thereof) cannot degrade the security of the system. There is absolutely no basis to assertions made by some cable industry parties to this proceeding that such standardized and nationally unified access control approaches are inherently less secure than present approaches.⁹

Because initially the installed base of consumer electronics equipment would not be configured in accordance with the interface schemes of Figure 1(c), configurations of stand-alone decoders such as Figure 1(d) are expected to be the dominant modes of providing access control to

⁶ We note that the economics and security advantages of such an approach have been recently utilized in the VideoCipher access control system used on C-band. The system has been recently converted to employ a Renewable Security Unit within the decoder module in order to predominantly perform cryptographic functions requiring security. See "Showtime Sets Commercial Upgrade" by Tom Middleton, Satellite Business News, Mar. 24, 1993, pp. 1, 22.

⁷ See Comments and Reply Comments of News Datacom, In the Matter of Inquiry into Encryption Technology for Satellite Cable Programming, PP Docket No. 92-234, December 24, 1992; January 26, 1993.

⁸ See Comments of DirecTV, Inc., In the Matter of Inquiry into Encryption Technology for Satellite Cable Programming, PP Docket No. 92-234, December 24, 1992.

⁹ In fact, the NCTA Office of Cable Theft study "1992 Theft of Service Survey Results" issued in December 1992, points to a contrary conclusion: Despite the cable industry's employment of about a dozen different access control and scrambling systems with generally unpublished characteristics, it is estimated that service theft results in over \$4.7 billion in unrealized revenue annually, some 24% of gross industry revenue in 1991.

new digital services. However, these decoders will require no secret information to be embedded within, nor would they be a target of piracy attacks. These decoders can be produced based on a published and accepted standard and thus would be subject to competitive market forces. The wide availability of such decoders from cable operators and retail vendors that are not affiliated with cable systems would thus be encouraged as required by Section 624A(c)(2)(C) of the Cable Act. Security modules or smart cards containing the Access Control Unit can be supplied by the cable companies in order to authorize and provide selective access to each subscriber.

2.2 The Commission Should Favor Non-Duplication of Hardware in Consumer Electronics Equipment and Access Control Equipment

We recommend that the Commission prescribe digital standards governing transmission, compression, and "standard security interface" system from the outset. We wish to clarify that such standards should be based on the configurations in accordance with Figure 1 (c) and (d). These configurations, that over time should ultimately lead to the dominance of configuration Figure 1(c), are defined herein as "Keystream Interfaces", as they provide a delineation between decoding hardware and minimal embodiment of access control hardware that clearly separate these function at the most efficient layer of keystream signals. The advantages of the keystream interface over other signal interfaces such as IF or baseband interfaces are as follows:

- Expanding the scope of hardware and systems that become subject to competitive supply. Allows unbundling of reception-demodulation-decoding hardware from access control hardware.
- Minimizing the redundancy of costly subsystems such as demodulators, decoders and decompressors. These systems' costs may reach several hundred dollars at the retail level.
- Provide higher level of security, flexibility and deterrence to pirates. The operator's ability to replace low cost security modules removes the economic incentive for pirate R&D investments in security breaches.
- Allows sharing of most functions required for Advanced Television reception with those of digital 525 line systems. (See discussion below).
- Unlike other interfaces, keystream interfaces can be easily expanded for the supply of two keystream signals for the simultaneous decoding of two channels for Picture-In-Picture ("PIP") or other advanced display functions. With one Access Control Unit providing dual keystream, this option will not require the provision of two decoders of the type shown in Figure 1(b) in every set or VCR designed with PIP features and the costly doubling of interface circuitry and sockets.¹⁰

¹⁰ In digital TV applications, it may be possible to provide a PIP function without additional tuner by utilizing the channel multiplex and decompression capability within one carrier. Since only an infrequent still frame sample may be required in the PIP insert, sufficient buffering would allow both pictures to be processed and additional memory would be the only incremental costs for such "intracarrier" PIP modes.

- Allows multiple vendors for Access Control systems.

2.3 Promotion of Competition in the Supply of Access Control Systems

Because the Access Control Unit interface information containing the protocol for the Access Control Messages and the Keystream signal specifications is a public standard, various vendors of access control systems can compete on the supply of such technology. These vendors may differ in their approach for supporting head-end services and billing interface capabilities as well as the implementation strengths of their security modules. It is important to recognize that a breach of security in one vendor's Access Control Units, does not impact the security of the installed decoder base. Rather, the Access Control Units (smart cards or security modules) can be replaced either with new improved units from the same vendor or from a competing vendor. Hence, the threshold for the displacement of Access Control vendor's technology is much lower in configurations of Figures 1(c) and (d) than that of Figure 1(b). This competitive tension should be a welcome development as it leads to reduced costs and improved security performance by Access Control vendors.¹¹

Another significant factor that should be kept in mind regarding access control standardization is the fact that topologies of cable systems are evolving and that several architectures involving multiple program origination sources (possibly controlled by different entities) may well be applied. These distinct program encoding sources may require the control of program access for the same subscriber equipment. Thus, the standardization of the full Access Control protocol as well as the transmission and compression standards will help guarantee the smooth transition from the architectures of Figure 2(a) to the type shown in Figure 2(b).

3 RELATION TO THE ADVANCED TELEVISION STANDARDIZATION PROCEEDING

The public interests that led to the Commission's decision to undertake the ATV standardization effort now in progress, included factors well beyond the fact ATV transmissions required spectrum allocation. The need to assure compatible equipment and competitive markets for ATV reception hardware was no less significant in the Commission's decision.

It is now anticipated that upon the adoption of an ATV standard, broadcasters will transmit digital ATV signals that many cable operators may (or likely be required to) carry on their system.¹² Manufacturers will manufacture TV sets with ATV capability and will offer them for

¹¹ The suggestion that competitive access control suppliers might respond more rapidly to security breaches is offered by two other parties in connection with the satellite encryption proceeding. See In the Matter of Inquiry into Encryption Technology for Satellite Cable Programming, PP Docket No. 92-234; PrimeTime Comments at 4; Scientific-Atlanta Comments at 12-15.

¹² While "Must Carry" rules do not yet extend to ATV transmission, the Cable Act states that "At such time as the Commission prescribes modifications of the standards for television broadcast signals, the Commission shall initiate a proceeding to establish any changes in the signal carriage requirements of cable television systems necessary to ensure cable carriage of such broadcast

sale to the general public. It is important to emphasize the amount of overlap between the circuitry and hardware required for digital ATV receivers and that required for digital 525 line television service now contemplated by cable operators. These include the front-end low phase noise tuner/converter, precision IF SAW filter, QAM demodulator, adaptive equalizer, forward error correction unit, carrier and bit timing acquisition system, decompression circuits, digital audio demultiplexer-decompressor and stereo digital to analog conversion, a portion of video memory, NTSC encoder and remodulator, On-screen Display and consumer interface function. It is inconceivable that a subscriber who has purchased such a digital set would have to face the financial burden of buying a set-top device that essentially duplicates all of the above functions in yet another digital decoder which only differs from his ATV set by not displaying a larger number of lines in a wider aspect ratio.

The Commission must now recognize that the recent industry essential unanimity on the advisability of prescribing standards for digital 525 line TV points to the inevitable need to prevent a divergence of paths that would lead to costly duplication of hardware and confusion in the marketplace.

Rather, combining the ATV standardization effort with digital 525 TV standards will provide the opportunity for consumers and cable operators to share and leverage investments in digital television equipment for the benefit of both services.

4 THE COMMISSION MUST NOT ALLOW INACTION TO CREATE FUTURE INCOMPATIBILITIES

The record in this proceeding is replete with explanations and historical accounts of the reasons for the present situation of access control equipment incompatibilities with consumer electronics. Titan believes that a significant contributor to the current situation is the long history of bundling the access control equipment supply with cable services. We submit that decoder interfaces that allow the furtherance of such bundling by the nature of the proprietary systems they require would be against the public interest. If security and costs considerations are satisfied, the public interest requires that factors relating to subscriber interests should weigh more heavily than the fact that there might be an accord between the cable and consumer electronics industries who both benefit from selling more costly hardware by agreeing on a compromise of configurations such as that of Figure 1(b).

5 THE COMMISSION SHOULD COMMENCE WITH INQUIRY AND RULEMAKING PROCEEDING FOR DIGITAL 525 LINE TV SYSTEMS WITHOUT DELAY

In light of the previous discussion, Titan believes that as a minimum, the Commission

signals of local commercial television stations which have been changed to conform with such modified standards." §614(b)(4)(B); (Emphasis supplied).

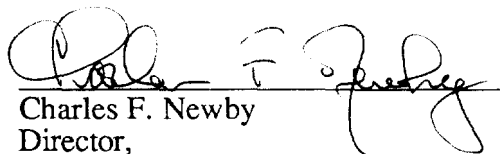
should institute an Inquiry into the standardization of digital television and the access control therefor. The issues in this type of a proceeding are of significant scope. We urge the Commission to make a determination and ask Congress for additional resources if they are required in order to address these important issues.

6 CONCLUSION

For the foregoing reasons, Titan respectfully recommends that the Commission adopt rules consistent with the Comments herein in order to assure the expansion of competitive forces into the access control market sector and in order to assure compatibility between cable systems and consumer electronics equipment.

Respectfully submitted,

THE TITAN CORPORATION.

By: 
Charles F. Newby
Director,
Broadcast Communication Systems

3033 Science Park Road
San Diego CA 92121
Telephone (619) 552-9797
Fax (619) 597-9055

January 25, 1994

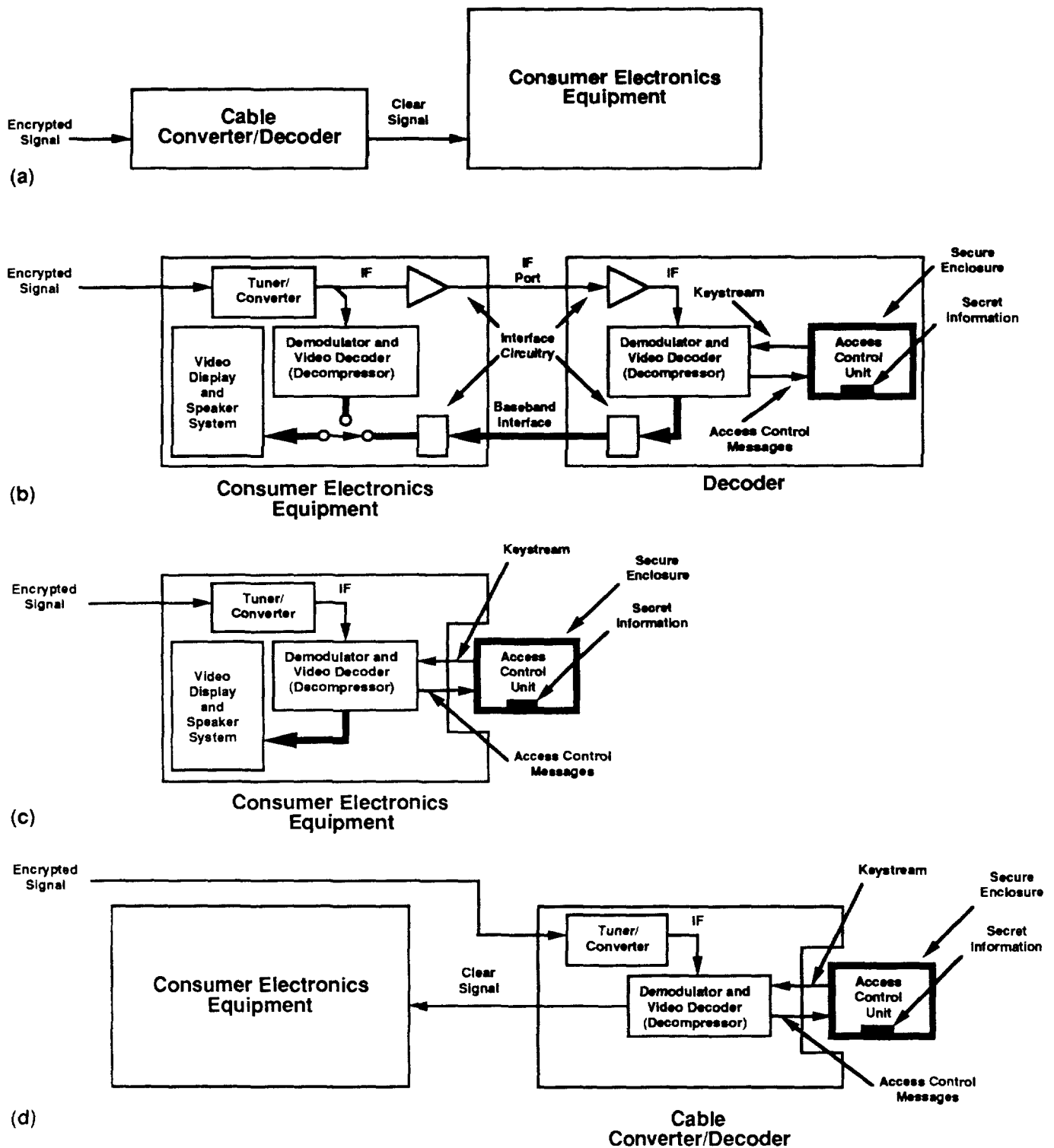
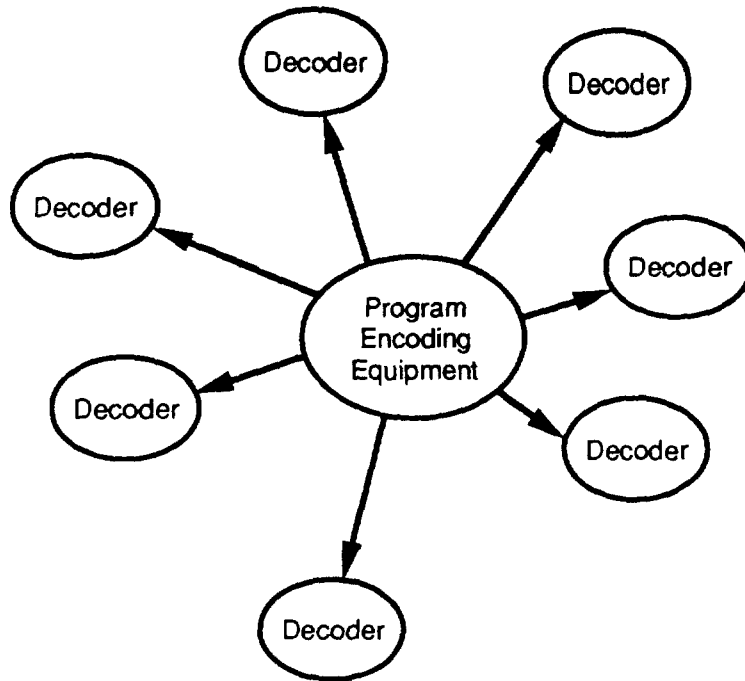
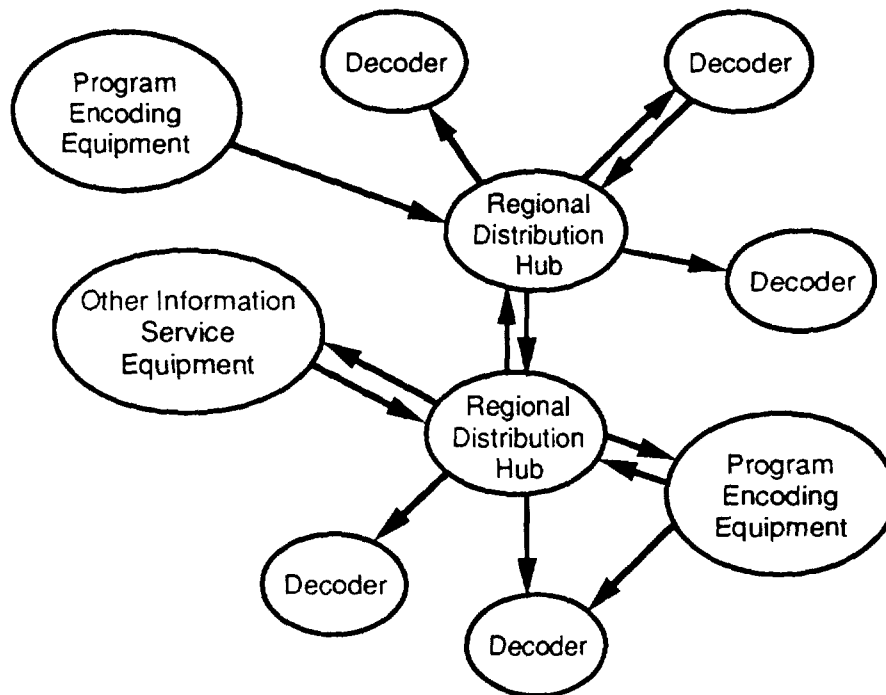


Figure 1



(a)



(b)

Figure 2

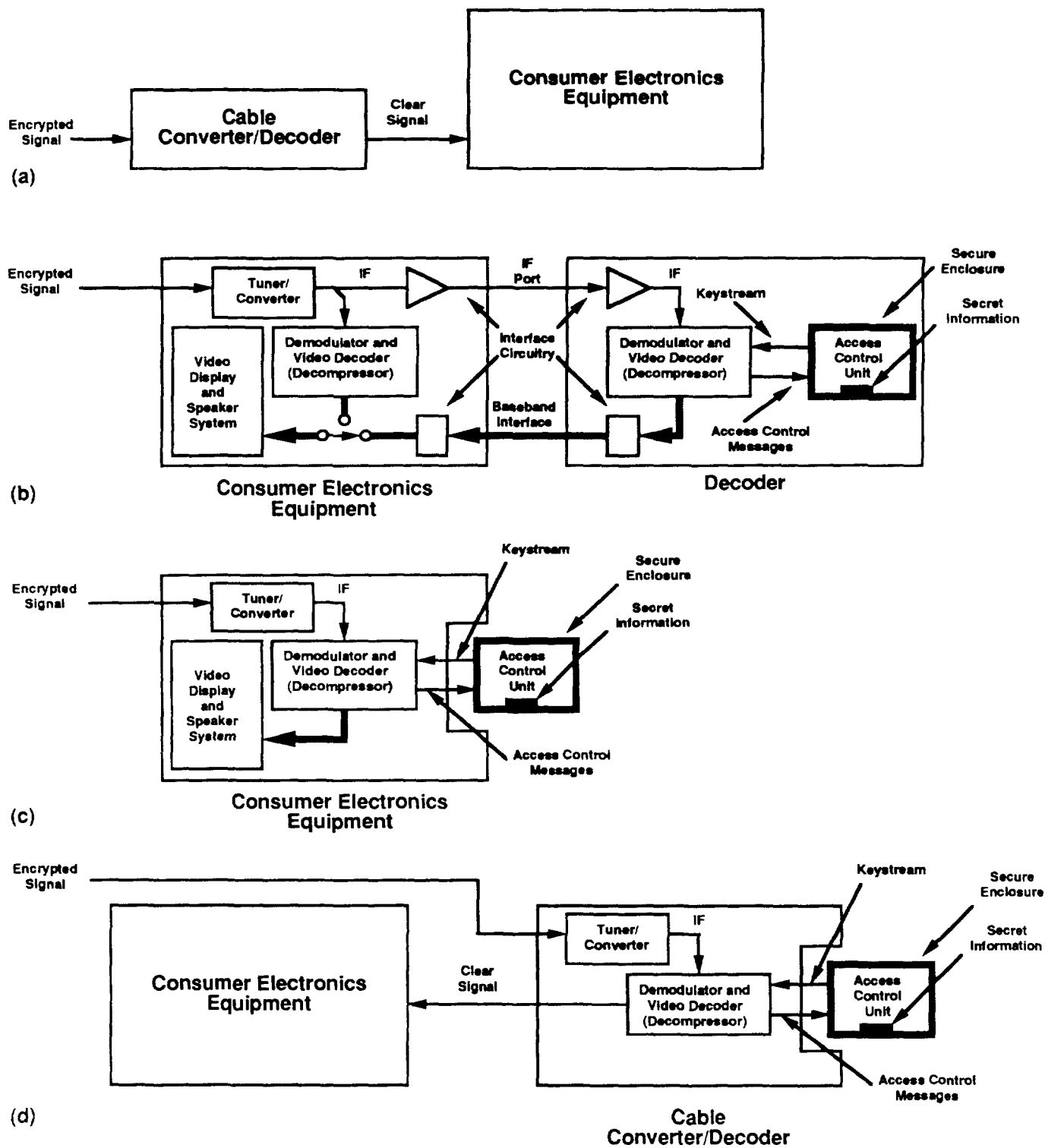
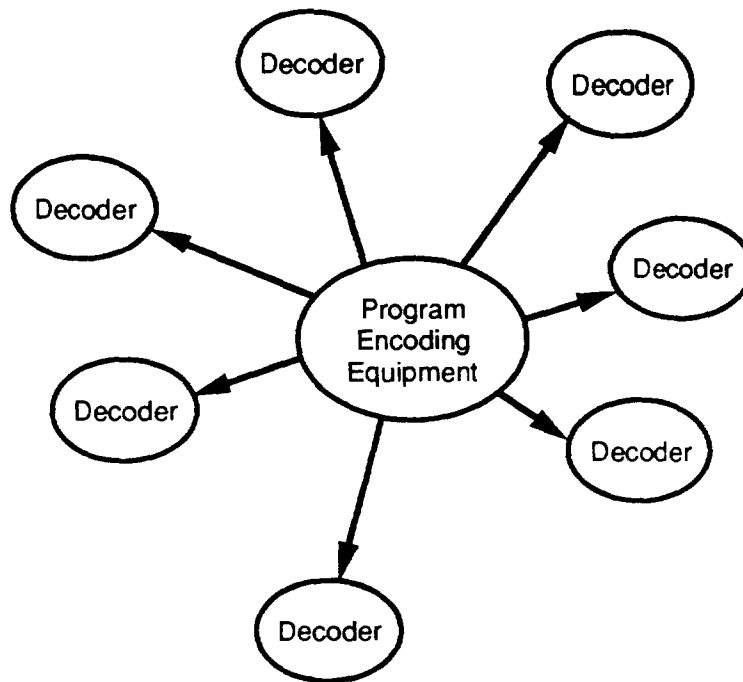
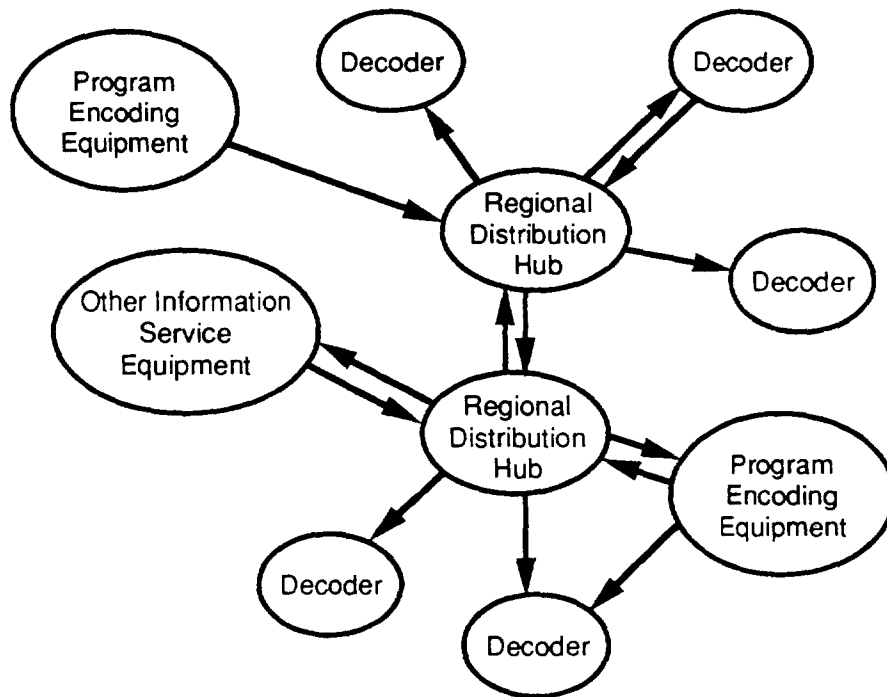


Figure 1



(a)



(b)

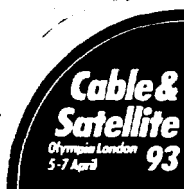
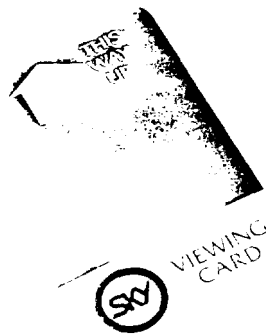
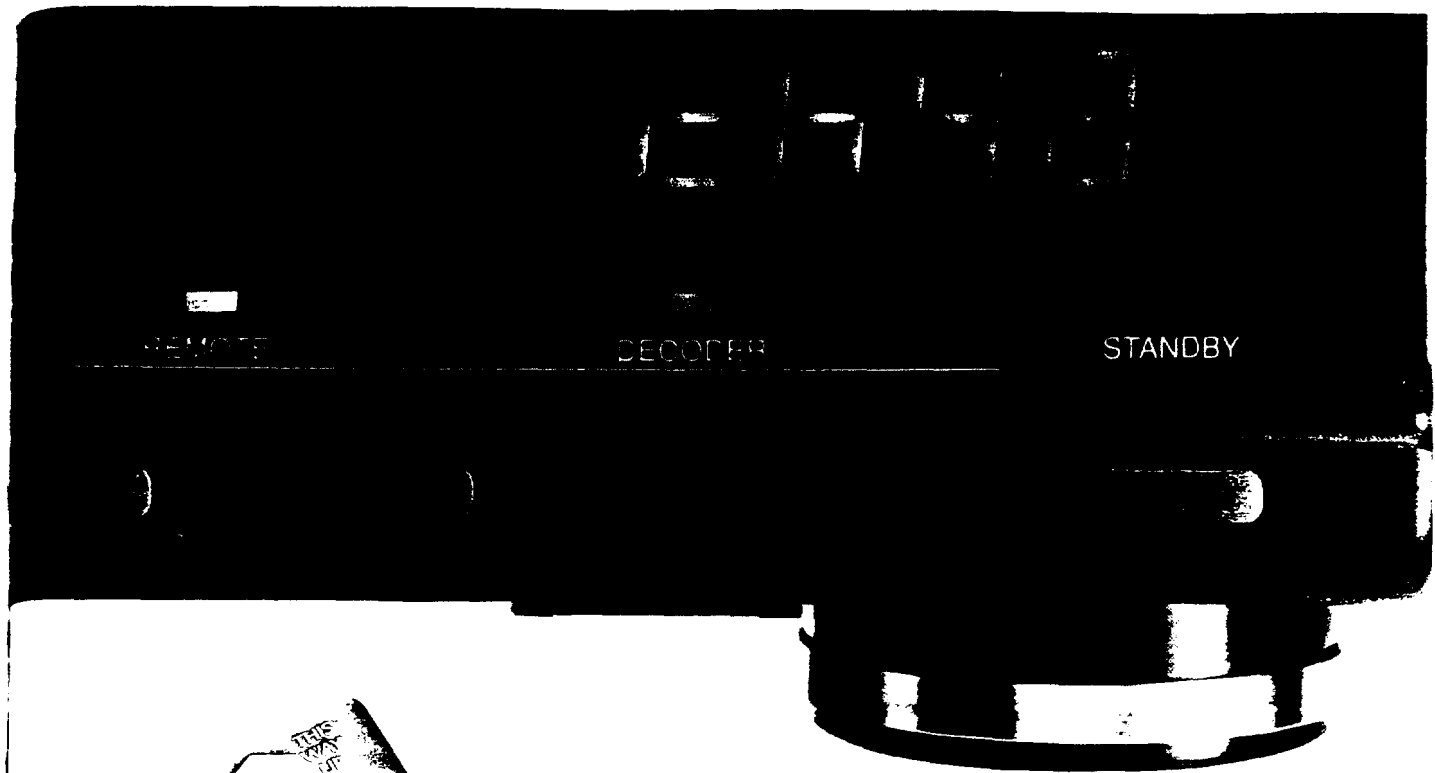
Figure 2

Attachment A

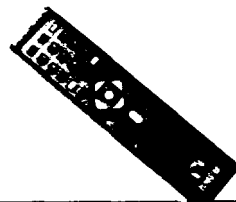
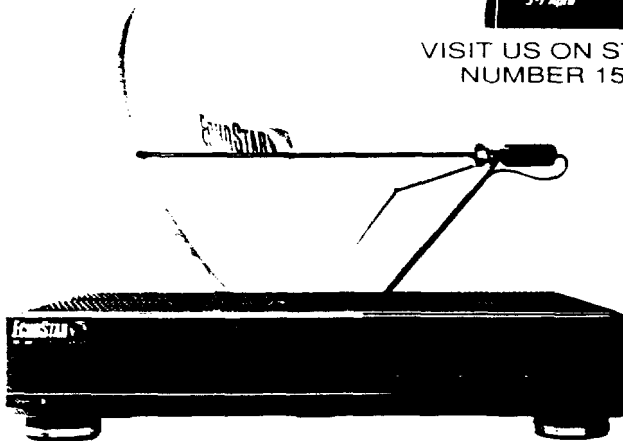
1. EchoStar IRD With Smart Card. "Cable and Satellite Europe", March 1993, page 31.
2. Connexions IRD With Smart Card. "Cable and Satellite Europe", March 1993, page 37.
3. Amstrad TV With Smart Card. "Cable and Satellite Europe", November 1991, page 7.
4. Amstrad VCR With Smart Card. "Cable and Satellite Europe", October 1991, page 9.
5. Maspro IRD With Smart Card. "Cable and Satellite Europe", September 1991, page 74.
6. Pace Decoder With Smart Card. "Cable and Satellite Europe", March 1993, page 74.

ECHOSTAR SR-7700 IRD

Satellite Receiver with SatTrack



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Why limit yourself by buying a satellite receiver without SatTrack?

Echostar's SR-7700 IRD with SatTrack promises you unlimited viewing pleasure by moving your satellite dish and tracking all available satellites. SatTrack allows you to watch over 100 channels of non-stop films, sports, music and news. Other satellite receivers restrict your viewing pleasure to just one satellite position with a limited number of programs.

The Echostar SR-7700 IRD with SatTrack designed by Echosphere, is the first satellite receiver to incorporate the antenna positioner. Videocrypt decoder and satellite receiver all in one beautifully designed unit.

Quality components and advanced technology have produced a receiver with unrivaled performance, reliability and ease of use. After all Echostar has more motorized satellite systems installed around the world than any other manufacturer. Don't you think you should be buying Echostar with SatTrack?

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CX200

- 200 programmable channels
- Built-in antenna positioner
- On-screen graphics
- Timer function

CX95A

- 99 channels
- Audio-video fully programmable
- Wegener Panda stereo
- 950-1050 MHz tuner

CX95A IRD

- Built-in decoder
- 99 channels
- Wegener Panda stereo
- Audio-video fully programmable



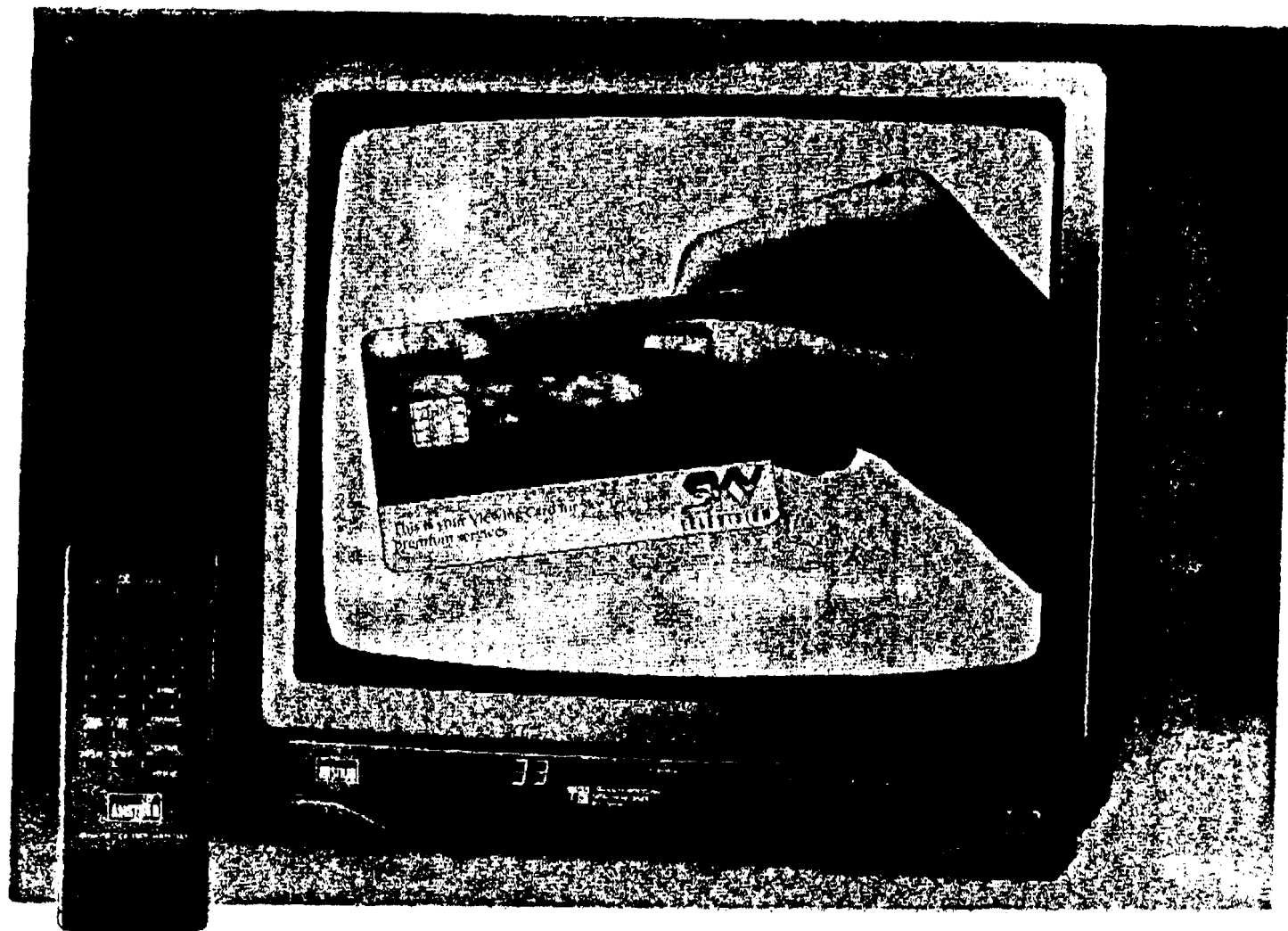
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Protel Distribution Ltd
Communication House, 375 High Road, Finchley,
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NOW AMSTRAD INTRODUCES TVs WITH SATELLITE SALES BUILT-IN

Amstrad, the first name in Satellite, has done it again with the STV20™ - a unique colour television with a satellite receiver and movie decoder actually built-in.

little more than they would normally pay they can have satellite TV as well, generating more dish sales for dealers.

It's a product development the industry has been waiting for, because it creates many more sales opportunities.

- Now your existing satellite customers who are thinking of buying a second TV, can buy this remote control combined TV and satellite receiver to expand their system.

- Non-satellite viewers thinking of buying a second TV won't be able to resist buying this two-in-one television - for



For a 20" remote control TV incorporating a 48 channel satellite receiver and decoder, on screen graphics, Wegener stereo sound and an alarm/sleep timer, the STV20 offers incredible value retailing at a modest £399.99 inc VAT (RRP)*.

High impact TV commercials are sure to create big demand - so make sure your stocks are sufficient.

For further details of the remarkable STV20 phone the Amstrad Dealer line on 0277 209209.

Plus files down' test

Plus has filed for legal action with the Bavarian media authority in Munich to force the state authorities to block national advertising times allocated to RTL during this winter when tennis

events arise when, during the tournament, transmitted in Germany by RTL, the channel attempted to show commercials during the 45-48-45 window for Bavaria's smaller broadcasters. In order to protect its exclusive rights, it used potential advertising. RTL Plus had to deal with the regional authorities to give them the right to broadcast programming during the duration of the

in the games agreed for the regional broadcasters for the night of their own commercial programme breaks. RTL Plus threatened to place in its programme the national

in the scheme was the Bavarian media authority in the regional states, including the TV and radio commercial advertising and agents. RTL Plus threatened to place in its programme the national

in the scheme was the Bavarian media authority in the regional states, including the TV and radio commercial advertising and agents. RTL Plus threatened to place in its programme the national



THE VIDEO RECORDER THAT KILLS TWO BIRDS WITH ONE STONE

Trust Amstrad to come up with another satellite product of vision - a video recorder with a built-in satellite receiver and Sky decoder.

It's a natural winner - for customers and for you - because it opens up so many more sales opportunities.

• Existing satellite customers who are thinking of buying a video recorder must buy this one, because now they can enjoy the benefits of watching one satellite programme whilst recording another satellite channel.

• Non-satellite customers offer an even more exciting sales prospect - imagine how these customers, coming in to buy an ordinary VCR, can easily be persuaded to kill two birds with one stone and buy the one with a satellite receiver

and decoder built in - thus allowing them to enter the world of satellite TV for around the same price they would pay for a normal VCR. It's a powerful sales story!

So stand by for more dish sales!

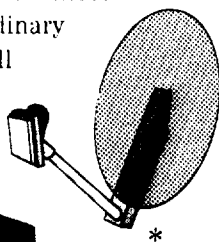
Both satellite video recorders in the Amstrad range incorporate a 48 channel receiver; a programmable remote control; 4 event / 1 month timer, and quick start record and play.

The VS1000 retails at £399.99 and the VS1140 with NICAM stereo and 4 head for perfect still and slow motion, retails at £499.99.

High impact TV commercials are sure to create a big demand - so make sure your stocks are plentiful.

For further details of the remarkable Amstrad satellite video,

Phone the Dealer Line on 0277 209209.



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INC VAT

■ NEW MASPRO DESIGNS

Maspro has entered the battle for pre-Christmas purchases with the introduction of the SRE300S. The design owes more to video recorders than recent satellite receivers with a large LED display and channel indicators. 70 pre-programmed channels include Astras 1A, B and C. In addition to basic features the receiver includes two programmable skew pairs for each stored channel: this allows the polariser to be moved to a more beneficial position in the event of interference. Ten programmes can be stored, and the childproof lock prevents unwanted viewing by tiny eyes. The W/N button allows deviation between different satellites to be compensated by varying the modulation of the video channel. The SRE350S IRD includes a built-in Videocrypt decoder.

Maspro is hoping that its new BSK65E dish will give a high degree of reflection precision. Both feedhorn and polariser operate on the principal of electromagnetic signal processing to enable exact transmission of

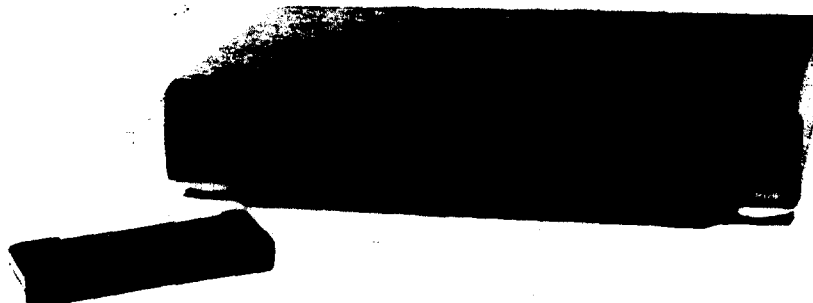
horizontal and vertical signals.

Retail price for the SRE350S IRD, complete with 60cm dish, is £349.95, with a trade price of £239.95.

The BSK65P brings the perforated dish to the Maspro range. The decision to make the antenna the offset reflector type was taken to

get the best picture quality, often a problem with mesh antennas.

Contact: C. Itoh Communications.
Schiess Strasse 74-76
4000 Düsseldorf 11, Germany
Tel: +49 (211) 596424



■ THREE COURSE DISHES

Swedish Microwave is expanding its range of dishes following the establishment of its antenna division SMW Antenn. The company is manufacturing dishes for

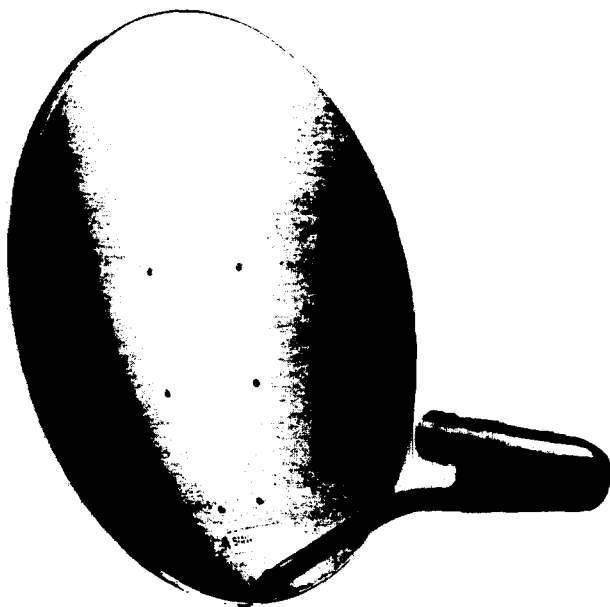
both the Scandinavian and continental European markets. The full development of the products should be complete by the autumn, but the company has

already announced three complete outdoor units which will be included in the range.

The 65cm offset dish SMWODU-650 is made of steel and comes complete with 1.2 dB LNB and feed rotor. Samples will be available by the end of September, with full production commencing in November.

The next dish up, the 85cm SMWODU-850 will be available with an Az/EI mount as well as the polar mount. A 1.2dB dual or single band LNB is included together with the feed rotor. Samples are expected in October, with full production in December. The ODU1050 carries the same specifications as the 850, but with dish size increased to 105cm. Samples will be available in November and production starts in December.

Contact: Swedish Microwave,
Box 230, S-591 23 Motala,
Sweden
Tel: +46 (141) 161 35
Fax: +46 (141) 152 24



■ PYRAMID LEADS

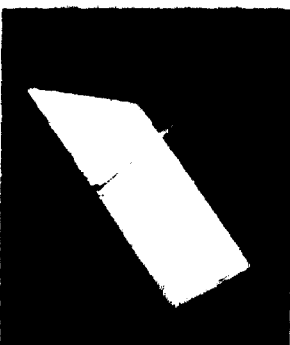
The Pyramid range of ready-assembled drop leads is now available through UK distributor ABP. The leads are constructed from Times Fiber or Comm/Scope RG6 and RG59 (67 per cent) braid/foil co-ax. The black or white leads are available in standard lengths, 1.0, 1.5, 1.8 and 2.0 metres with custom length cables available on request.

Also available are Belling Lee male and female connectors, available in RG59 and RG6 versions, and accommodating any RG59 or RG6 cable, regardless of manufacturer.

Contact: ABP 9 Campbell Court, Campbell Road, Bramley, Basingstoke, Hants. RG26 5EG
Tel: +44 (256) 881525
Fax: +44 (256) 882866

INNOVATIONS

■ Portasat thinks bigger



Portasat, the company responsible for the novel, deckchair-style fold-away portable 60cm antenna, has designed and put into production a square, 1.2m version of the concept. The unit is supplied as four 60cm square panels which are assembled within a metal frame.

Gain, according to Portasat, is in excess of 41dB, with beamwidth less than 1.5 degrees. The company intends to market the product to caravan and mobile home owners across Europe, as an inexpensive and simple way of doubling the area in which they can view Astra channels, as well as allowing them to tune into Eutelsat and Intelsat signals. It is particularly targeting visitors to Spain, where a larger dish size is required.

Portasat has now refined the 60cm circular flat-zone plate antenna and will be re-launching the unit — which uses new materials and different manufacturing techniques to the original product. Contact: Portasat Ltd, PO Box 62, Letchworth, Hertfordshire SG7 5RY. Tel: +44 (462) 742854. Fax: +44 (462) 742893.

■ Connexions return

Back in the UK market after an absence of three years, Connexions is introducing two new receivers. The oldest satellite receiver manu-



facturer in the UK, Connexions is taking advantage of what it sees as a window of opportunity following recent price increases by market leaders Pace and Amstrad. The past three years have seen Connexions concentrating on the export market.

The CX95A IRD provides 99 channels retunable across video (950-2050MHz) and audio (5.0-8.8MHz). It comes with remote control, switchable audio bandwidths, audio de-emphasis and Panda Wegener Stereo.

The CX200 is aimed at the motorised market with 200 re-programmable channels (again with tuning from 950-2050MHz), a four-week, eight-event timer, triple audio bandwidths, three-language on-screen graphics, a 50-satellite position memory and parental lock.

Retail price for the CX95A IRD is £279, while the CX200 is £299. Contact: Tony Hook, Connexions, Unit 3, Travellers Close, Welham Green, Hertfordshire AL9 7LE. Tel: +44 (707) 272091. Fax: +44 (707) 269444.

■ Communicado gets the Best

Communicado has acquired UK distribution rights to Best receivers and will launch an IRD/dish/LNB package this April, backed by a promotional campaign for independent dealers.

The system is based on the Best 97 IRD, featuring 99 programmable channels with the unique channel swap facility to avoid time-consuming retuning, twin scart sockets, auto contrast control, Wegener-compatible stereo and fully tunable audio.

The package will retail at £229, and will be launched together with a range of incentives and point-of-sale materials for dealers at the Cable & Satellite Show in London next month. Contact: Communicado, Unit 3, Noke Lane Business Centre, Noke Lane, St Albans, Hertfordshire AL2 3NY. Tel: +44 (727) 810810. Fax: +44 (727) 810161.



■ Tunnelling through

Radio Frequency Systems Hannover has reduced the coupling loss on its radiating Radiaflex cables by some 10dB. The company says the reduction has been achieved by a reconfiguration of slots in the outer conductors of its RLF 9/23- and RLF 13/33-type cables. The improvement allows for longer transmission distances and provides improved performance for digital transmissions. The cables are normally used alongside roads and railways, often in tunnels as they are not sensitive to dust deposits.

Contact: Radio Frequency Systems Hannover, Postfach 260, D-3000, Hannover 1, Germany. Tel: +49 (511) 676 3733. Fax: +49 (511) 676 3178.

■ World-Sat discovers Columbus

At the high-end of satellite receivers, World-Sat has launched the Columbus range of receivers. The low threshold units, manufactured by Palcom in Japan and Malaysia, have been tested in the Middle East and Africa with, says World-Sat, "brilliant results."

The Cherokee 100 comes with 100 channels, two scart sockets, phono sockets, tuning from 950 to 1750MHz, on-screen graphics in English, German, French and Spanish, and video timer. The 200 provides an additional LNB input plus tuning up to 2050MHz and two video bandwidths (27/18MHz).

The Columbus Cherokee 100 and 200 are available now with a third

receiver, the Cherokee 300, to be added shortly. The Cherokee 1000 is planned for early June and comes complete with integrated receiver and positioner. From the summer a new option will give all Palcom tuners (and consequently the Columbus range) a threshold of 4.5dB. This should improve reception in the Middle East and reduce the dish size required in Europe. Contact: World-Sat, Texas de France, Cours Belsunce, 13001 Marseille, France. Tel: +33 91 91 70 32. Fax: +33 91 90 66 15.

■ Europe unscrambled

VideoCrypt is spreading into continental Europe and Scandinavia with the arrival of the Pace VC100



decoder. The stand-alone unit consists of a smart card reader and a switching unit to change between flat and Pal de-emphasised. The decoder was previously restricted to the UK market where it is required to decode four of the six Sky channels and a growing number of other broadcasters. On a pan-European